

**Remarks/Arguments:**

Claims 1, 3-7, 9, 10, 12, 14, 15, 17-20, 22, 23, and 26 are pending in this application. Claims 1, 12, and 26 are currently amended for clarity. No new matter has been added.

**Claim Objections**

**Claim 3:**

Claim 3 is objected to, as an improper dependent, because the phrase "support comprises" in claim 3 is allegedly inconsistent with the language "consisting of" used in claim 1. Applicants respectfully disagree. As is evident, claim 1 recites that the catalyst *consists of* three elements, namely: (i) a palladium compound; (ii) a support material selected from the listed materials; and (iii) a compound of a lanthanide.

The transitional phrase "consisting of" excludes any element, step, or ingredient not specified in the claim. See *Ex parte Davis*, 80 USPQ 448, 450 (Bd. App. 1948) ("consisting of" defined as "closing the claim to the inclusion of materials other than those recited except for impurities ordinarily associated therewith."). See also M.P.E.P. 2111.03. Thus, the catalyst only includes the three elements recited, except for impurities.

Claim 1 limits the support material to a material selected from the group consisting of titania, magnesia, alumina, silica-alumina, a calcium-aluminate cement and mixtures thereof.

The use of "comprises" in claim 3 is not inconsistent with the "consists of" language used in claim 1 because the support material may consist of alumina plus any of the other support materials listed in the "consisting of" group in claim 1, namely titania, magnesia, silica -alumina or a calcium-aluminate cement. In other words, "comprises" in claim 3 means that, of the possible support materials listed in claim 1, the support material must include alumina.

Accordingly, the assertion that "claim 3 does not exclude additional, unrecited elements" is incorrect. All of the possible elements which could be included in the support of claim 3 are recited in claim 1, from which claim 3 depends. Therefore, Applicants respectfully request that this rejection be withdrawn.

**Claims 12, 14, 15, 17-20, 22, 23 and 26:**

Claims 12 and 26 stand objected to for the phrase "the range of 50 ppm about 1000 ppm." The typographical error has been corrected as suggested in the Office Action for each of these claims. The amendment is supported at page 5, line 8 of the specification. No new matter has been added. Accordingly, Applicants respectfully submit that these objections are now moot.

**Claim Rejections 35 U.S.C. § 112**

**Claims 1, 4-7, 9, and 10:**

Claims 1, 4-7, 9, and 10 stand rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement because the original disclosure allegedly does not support the claimed "catalyst consisting of." Applicants respectfully disagree.

The standard for written description is whether the specification conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, applicant was in possession of the invention as now claimed. See M.P.E.P. 2163.02 and *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991). Moreover, the subject matter of the claim need not be described literally (i.e., using the same terms or *in haec verba*) in order for the disclosure to satisfy the description requirement. Thus, the "catalyst consisting of" three elements, namely: (i) a palladium compound; (ii) a support material selected from the listed materials; and (iii) a compound of a lanthanide is clearly supported in the original specification. First, a person of ordinary skill in the art would recognize that all of the examples demonstrate catalysts containing only the elements recited in claim 1. In particular, each of the examples disclose only Pd with a lanthanide on an alumina support. Second, the original claims recited that "the catalyst consists essentially of," which would surely encompass the catalyst consisting of only those recited elements. Third, the specification discloses a layer of only Pd and the lanthanide compound at or near the surface of the support. See page 6, lines 30-38 of the specification. Lastly, Applicants note that there is no restriction on changing the scope of the claims during prosecution as long as the requirements of Section 112 are met, as they are here. While the priority document included zinc or cerium as promoters, zinc is not included in the presently claimed catalysts. Moreover, nothing in the present application suggests that zinc is, or should be, included in the claimed catalysts. In particular, zinc is mentioned three times in the

description of this application: at page 2, line 33, and page 3, lines 14 and 18, in each case in connection with a description of the prior art.

For all the foregoing reasons, Applicants respectfully request that the written description rejections be withdrawn.

**Claim 26:**

Claim 26 stands rejected under 35 U.S.C. §112, second paragraph as indefinite for use of the term "in the range of 50 ppm about 1000 ppm." As noted above, the typographical error has been corrected for claim 26. The amendment is supported at page 5, line 8 of the specification. No new matter has been added. Accordingly, Applicants respectfully submit that this rejection is now moot.

**Rejections under 35 U.S.C. §§102 and 103**

Claims 1, 3, 5, 6, 7, 9, 10, 12, 14, 15, 17-20, 22, 23, and 26 stand rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 2,909,578 (Anderson) or alternatively under 35 U.S.C. § 103 as obvious over Anderson in view of U.S. Publication No. 2002/0068843 (Dai). Claim 4 stands rejected as obvious over Anderson or alternatively as obvious over Anderson in view of Dai and U.S. Patent No. 3,549,720 (Wright).

Applicants respectfully submit that there was some prior misinterpretation of the claims. In order to clarify the scope of the claims and, in particular, what the catalyst includes, claims 1, 12, and 26 have been amended to highlight the claimed features. No new matter has been added.

In particular, claim 1, as currently amended, recites:

A catalyst suitable for use in the hydrogenation of a hydrogenatable organic compound, said catalyst consisting of:

- (i) a palladium compound;
  - (ii) a support material selected from the group consisting of titania, magnesia, alumina, silica-alumina, a calcium-aluminate cement and mixtures thereof; and
  - (iii) a compound of a lanthanide,
- wherein said palladium compound being supported on said support material and the palladium is present at a level in the range of about 50 ppm to about 1000 ppm by weight calculated as Pd metal and the weight of the total catalyst.

**Response to Anticipation Rejections**

Claims 1, 3, 5, 6, 7, 9, 10, 12, 14, 15, 17-20, 22, 23, and 26 stand rejected as anticipated by Anderson.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." M.P.E.P. §2131 *citing Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

First, Anderson fails to disclose or suggest that the catalyst includes a lanthanide. Anderson describes hydrogenation using a catalyst which "comprises palladium metal supported on alumina, the palladium metal constituting about 0.00001 to 0.0014 percent of the total catalyst weight and a palladium metal content of about 0.0001 percent of the total catalyst weight is preferred." See column 2, lines 5-9 of Anderson.

Anderson does not mention any metals for use in the catalyst other than palladium (and the aluminium present in the alumina support). Claim 1 requires the presence of a compound of a lanthanide in the catalyst, however.

Second, Anderson fails to disclose or suggest that the palladium is present at a level in the range of about 50 ppm to about 100 ppm by weight calculated as Pd metal and the weight of the total catalyst.

The Office Action asserts that 0.00001 to 0.0014 percent (Anderson's catalyst) allegedly equals about 10 ppm – 1400 ppm and therefore overlaps the claimed range of 50 – 1000 ppm. See Office Action at the bottom of page 6 to the top of page 7. This conversion is incorrect, however.

0.00001 percent actually equals 0.1 ppm and 0.0014 percent equals 14 ppm. 1 ppm is 1/1,000,000 or 0.000001 which would be 0.0001%. Therefore, to convert to parts per million, the value is multiplied by  $10^4$ . For example, 0.00001% is  $1 \times 10^{-5} \times 10^4$  parts per million = 0.1 ppm. Thus, the range of 0.1 – 14 ppm disclosed in Anderson does not overlap or touch the claimed range of 50 – 1000 ppm. See M.P.E.P. § 2131.03.

Applicants note that the Office Action states that the term "a level" in the phrase "a level in the range of about 50ppm to about 1000 ppm" allegedly renders the claims unclear. Office Action about halfway down page 7. Applicants respectfully disagree.

A person of ordinary skill in the art would readily appreciate that "a level" in the context of this application means an amount or a concentration. In particular, "level" is used in the specification at page 5, lines 35 and 38 to refer to the amount of palladium. Additionally, "amount", "loading", and "concentration" are used at page 6, lines 3, 26, and 25, respectively, when referring to the amount of Pd in the catalyst. Because the term "level" is used in association with the unit "ppm", it is very clear to one of ordinary skill in the art that "a level" refers to an amount or concentration of Pd calculated as a percentage by weight of the total catalyst weight.

Accordingly, as Anderson fails to disclose the features claimed, claim 1 is not anticipated by Anderson. Claims 3-7, 9, and 10 depend, directly or indirectly, from claim 1 and should each be allowable as dependent thereon.

Claim 12, while not identical to claim 1, recites similar features including the catalyst includes a lanthanide and the palladium is present at a level in the range of about 50 ppm to about 100 ppm. As Anderson fails to teach or suggest the features of claim 12, claim 12 is also not anticipated by Anderson. Claims 14, 15, 17-20, 22, and 23 depend from claim 12, and therefore should each be allowed as dependent thereon.

Claim 26, while not identical to claim 1, recites similar features including the catalyst includes a lanthanide and the palladium is present at a level in the range of about 50 ppm to about 100 ppm. As Anderson fails to teach or suggest the features of claim 26, claim 26 is also not anticipated by Anderson.

#### **Response to Obviousness Rejections**

Alternatively, claims 1, 3, 5, 6, 7, 9, 10, 12, 14, 15, 17-20, 22, 23, and 26 stand rejected as obvious over Anderson in view of Dai. Claim 4 stands rejected as obvious over Anderson or alternatively as obvious over Anderson in view of Dai and Wright.

"To establish a *prima facie* case of obviousness, ... the prior art reference (or references when combined) must teach or suggest all the claim limitations." M.P.E.P. §2143. Additionally, as set forth by the Supreme Court in KSR Int'l Co. v. Teleflex, Inc., 550 U.S. 398 (2007), it is

necessary to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art elements in the manner claimed.

The proposed combination of Anderson and Dai fail to disclose or suggest a catalyst *consisting of* a palladium compound; a support material; and a compound of a lanthanide.

As noted above, Anderson fails to disclose or suggest a lanthanide. The Office Action relies on Dai for teaching cerium, a rare earth metal. Office Action page 9. Dai also includes other necessary and essential ingredients, however.

The transitional phrase "consisting of" excludes any element, step, or ingredient not specified in the claim. See *In re Gray*, 53 F.2d 520, 11 USPQ 255 (CCPA 1931). See also M.P.E.P. 2111.03.

Dai describes a catalyst for selective hydrogenation containing on a support:

(1) palladium; (2) a metal selected from Ag, Cu, Zn, etc.; (3) at least one rare earth metal; and (4) bismuth. See Dai at page 2, paragraphs 13 – 18. Components (4) and (2), namely, the bismuth and silver, etc. are essential to the catalyst as demonstrated by their inclusion in the list of compounds comprised in the catalyst and also as shown in the examples. All of the Examples in Dai contain silver in addition to palladium. Comparing Comparative Example 4 with Comparative Example 5 (first two lines of Table 2 on page 6 of Dai), the beneficial effect of the bismuth is shown in the increased ethylene selectivity and decreased acetylene in the outlet gas. Dai does not disclose or suggest any catalyst consisting of the Pd, the support, and a lanthanide (thereby excluding Ag and Bi).

The Office Action states that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the cerium of Dai with the catalyst of Anderson for the benefit of promoter action on the catalyst." Office Action page 9. As discussed above, however, Dai demonstrates that Ag and Bi are essential and material to the performance of Pd catalysts in the hydrogenation reactions. Therefore, it would not be obvious to a person of ordinary skill in the art to modify Anderson in such a way that does not include bismuth and a compound of silver.

As the proposed combination of Anderson and Dai fail to disclose or suggest a catalyst *consisting of* a palladium compound; a support material; and a compound of a lanthanide, a

*prima facie* case of obviousness has not been established. Accordingly, claims 1, 3-7, 9, 10, and 26 should be deemed allowable.

As previously noted, claim 12, while not identical to claim 1, recites similar features. Additionally, claim 12 recites that the catalyst *consists essentially of* a palladium compound; a support material; and a compound of a lanthanide.

The transitional phrase "consisting essentially of" limits the scope of a claim to the elements specified and those that do not materially affect the basic and novel characteristics of the claimed invention. See *In re Herz*, 537 F.2d 549, 551-52 (CCPA 1976). See also M.P.E.P. 2111.03. As discussed in detail above, Dai demonstrates that Ag and Bi are essential and material to the performance of Pd catalysts in the hydrogenation reactions. Thus, Ag and Bi are additional, necessary elements that are present in the catalyst. Moreover, Ag and Bi would affect the basic and novel characteristics of the claimed invention because including Ag and Bi would change the claimed invention by impacting the selective hydrogenation of an acetylenic compound.

Therefore, a *prima facie* case of obviousness has not been shown, and claims 12, 14, 15, 17-20, 22, and 23 should be deemed allowable.

Additionally, the combination of Anderson and Dai is improper and would not lead to the claimed invention. Dai, considered in its entirety, includes portions that are contradictory to the proposed combination with Anderson and the claimed invention. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). See also M.P.E.P. § 2141.02.

Dai uses an amount of active component (1) (Pt, Pd, Ni, Ru, Co or Rh) which is 0.001 – 1% by weight. See Dai paragraph 0027. This overlaps the very top end of the Anderson range (0.00001 – 0.0014%) for Pd content. Anderson states that "while those catalysts having palladium concentrations in the range of 0.0003 – 0.00125 percent by weight are operable, they promote excessive olefin hydrogenation." Column 2, lines 54 – 57 of Anderson. It would therefore be reasonable to interpret Anderson as teaching that a palladium concentration greater than about 0.0003% is not desirable. Dai's lowest precious metal concentration of 0.001% by weight is more than three times greater than the amount of Pd considered by Anderson to promote excessive olefin hydrogenation. Dai's preferred ranges for the precious

metal compound are 0.008 – 0.3%, especially 0.01 – 0.15%, all of which are very considerably higher than the amount of palladium suggested by Anderson. It would not, therefore, have been obvious to combine the teaching in the references of Anderson and Dai because they are not compatible. If a person of ordinary skill in the art follows the teachings of Anderson, then the palladium loading is below the level stipulated in Dai. If Dai is followed, then Anderson teaches that the catalyst will produce excessive olefin hydrogenation.

As the proposed combination of Anderson with Dai would be improper, the Office has not met its burden in this regard either.

With respect to claim 4, claim 4 is dependent on claim 1 and should be deemed allowable for all of the reasons set forth above. Additionally, Applicants note that Wright is relied upon for allegedly teaching catalysts with a majority quantity of pore diameter smaller than 800 angstroms. Office Action page 13. It is noted that Wright states at column 2, lines 31 – 34 that "the major quantity of the pores must have diameters smaller than 800 Å. Preferably more than fifty percent of the pores have diameters smaller than 350 Å." A major quantity of the pores that *must* have diameters smaller than 800 Å (0.08 microns) does not necessarily produce a mean pore diameter in the claimed range from 0.05 – 1 micron. 0.08 microns is very near the bottom of the claimed range for mean pore diameter. The mean would be calculated on the basis of all of the pores including the large pores. Wright states that his alumina "has very few pores larger than 800 angstrom units in diameter. Calcination further reduces the pore size so that the majority of pores are in the range below 350 Angstrom units in diameter." See column 2, lines 50 – 53 of Wright. Accordingly, for this reason as well, claim 4 should be deemed allowable.

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**Conclusion**

In view of the amendments and arguments set forth above, Applicant respectfully submits that the pending application is in condition for allowance. Notice to this effect is earnestly solicited.

Respectfully submitted,



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